

PHYSICS HOLIDAY ASSIGNMENT

1. Highlight **two** facts which show that the heat from the sun does not reach the earth surface by convection.
2. The diagram below shows the essential features of a solar heating panel. A small electric pump circulates the liquid through the pipes.

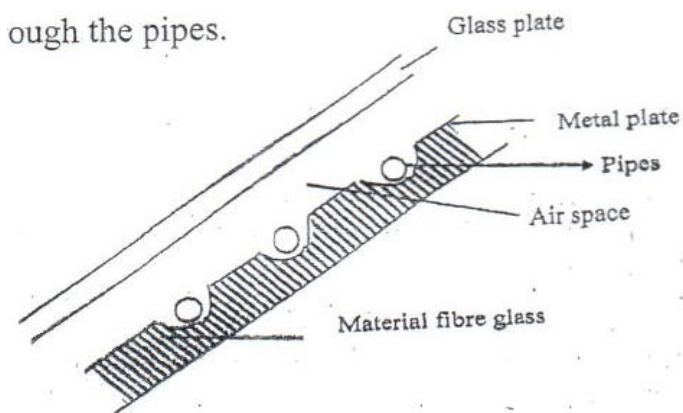


Figure 1

State briefly why:

- (i) The pipes and metal plates are blackened.
There is a material fiber glass on the panel.

3. The figure below shows an electric iron

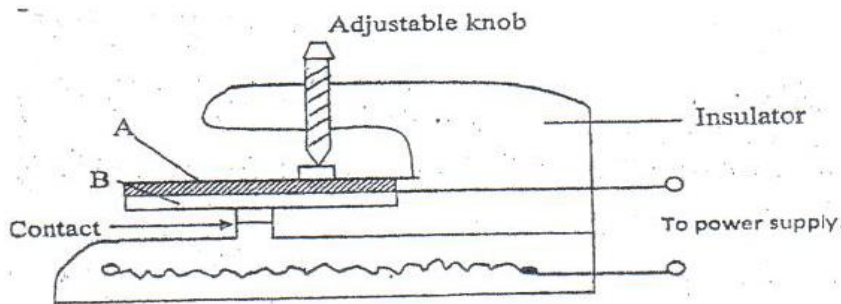


Figure 2

Two metal plates A and B are riveted to form a bimetal strip as used above.

- (i) Which metal expands more

Explain how the electric iron works when the power is on

4. Given that a material X of density 8.5g/cm^3 is attached to a piece of wood of mass 100g and density 0.2g/cm^3 . Calculate the volume of material X which must be attached to the piece of wood so that the two together just submerge beneath liquid of density 1.2g/cm^3 .
5. The mass of a lump of gold remains constant wherever it may be shifted to. Explain

6. The figure 2 below shows a hydraulic p

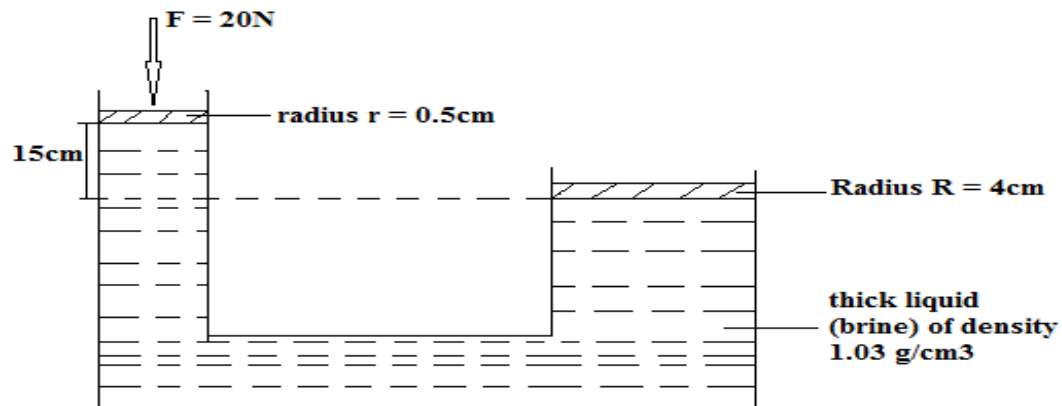


Figure 3

- a. Determine the maximum load that can be pressed by the machine.
 - b. State one property of the brake fluid.
7. A pollen grain is placed in water, state and explain the direction in which it moves.
8. The figure 4 below is a paddle wheel made of a light material and is well-oiled. In which direction will it rotate?

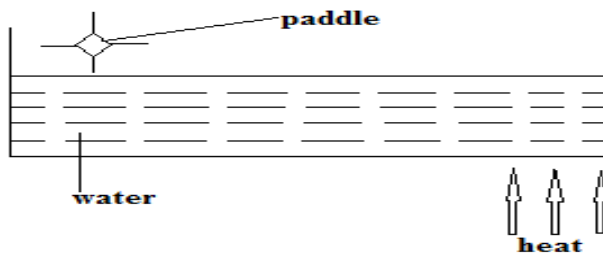
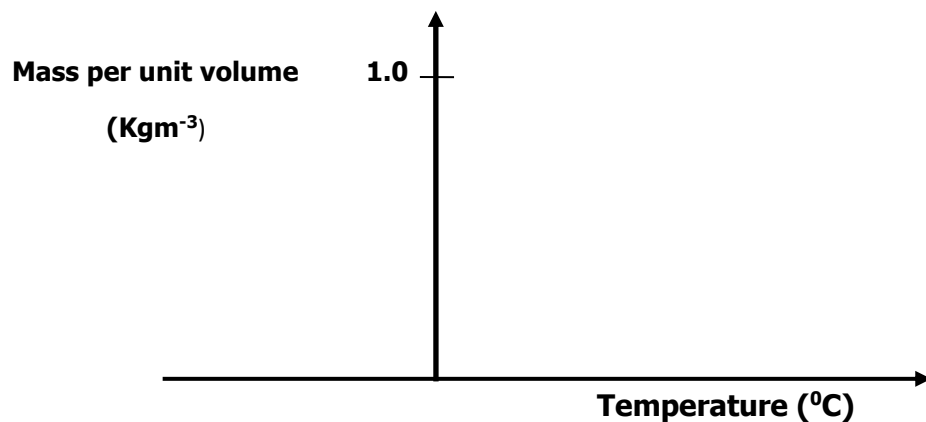


Figure 4

- a. In which direction will it rotate?
- Two thin blankets are warmer than a single thick one. Explain.
9. Sketch a graph of density against temperature of water cooling from 10° C to 0°C



10. In an experiment investigating Brownian Motion, smoke particles are used. State any **two** reasons why smoke particles are suitable for this experiment.

11. **Figure 4** below shows a smoke box with two chimneys A and B.

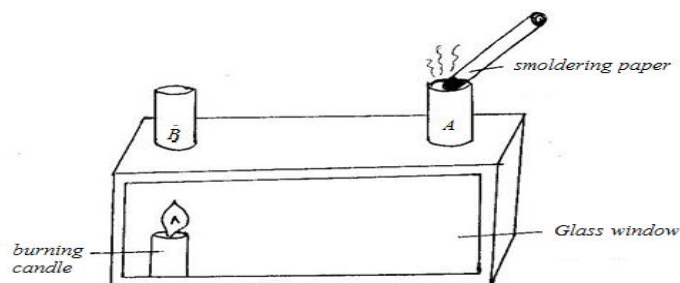


Figure 5

A moldering paper (producing smoke) is placed at the mouth of chimney A and a piece of burning candle is placed under chimney B as shown.

- (i) Sketch on the diagram what is likely to be observed. Explain your answer in (i) above.

12. The figure below shows the level of water in a measuring cylinder. 20 lead shots each of volume 0.5cm^3 are dropped into the water. Indicate on the diagram the new water level.

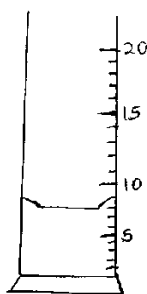


Figure 6

13. The figure below shows the features of a dry leclanche cell. Use the information to answer the questions which follow.

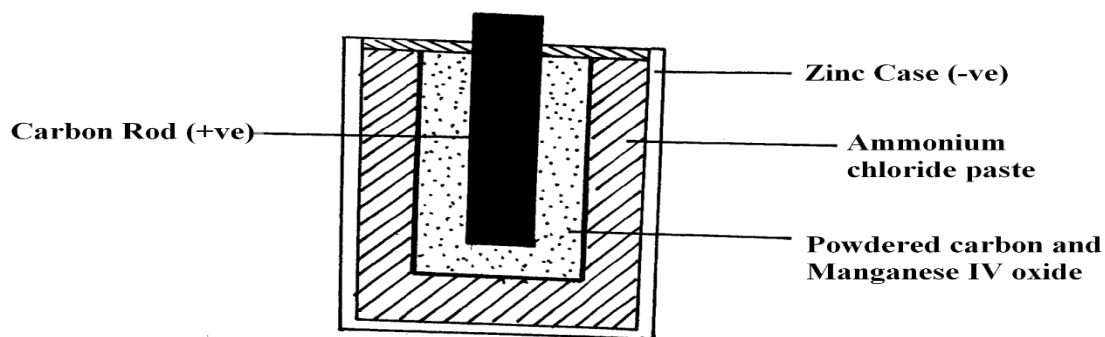


Figure 7

- a) What is the source of energy in the above dry cell?
- b) What is the function of:
 - i) Manganese IV Oxide
 - ii) Powdered carbon
- c) A student connected the circuit as in fig 3. State what happens when S_2 is closed

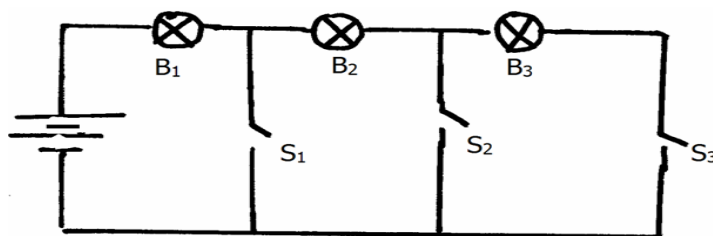


Figure 3

Figure 8

- d) State the basic law of electrostatic charges.
 - e) State the observation on the leaves of a positively charged electroscope when a negative charge is brought near it.
 - f) Name **two** measurements you would need to determine whether a lead acid accumulator is fully charged.
14. i) Define pressure.
- ii) A student of a certain school connected a U-tube to a gas supply in the laboratory and obtained the readings as shown below.

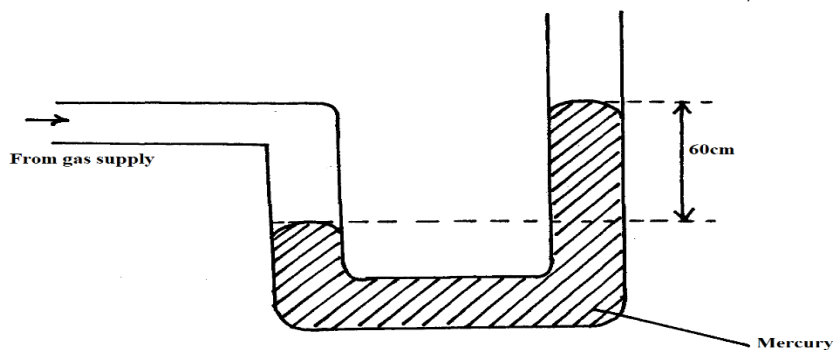


Figure 9

Given that the density of mercury is 13600 kg/m^3 and the atmospheric pressure is 760 mmHg . Determine the gas pressure in mmHg .

- iii) State three properties of a suitable hydraulic fluid.
- iv) A hole of diameter 1.0 mm is made in the side of a water pipe. If the Pressure of the flow is maintained at $3.0 \times 10^6 \text{ Nm}^{-2}$, calculate the force with which the water jets out of the hole.
- v) A block of dimension 0.2 m by 0.1 m by 5 cm has a mass of 500 g and rests on a flat surface. Determine the least pressure that can be exerted by the block on the surface.

15. Some water is poured in two test tubes, one painted black and the other one polished. The apparatus were set up as shown and left in the sun for some times.

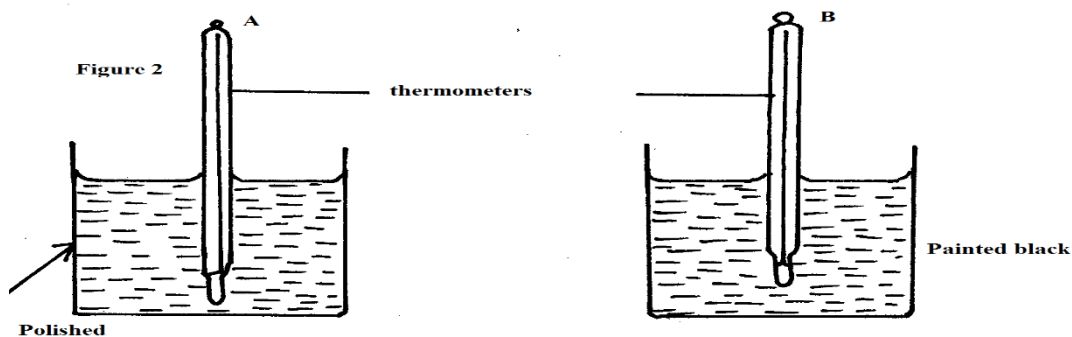


Figure 10

- i) State which thermometer records a higher reading after 20 minutes. Give a reason for your answer.

- ii) The figure below shows a flask fitted with a glass tube into a beaker containing water at room temperature.

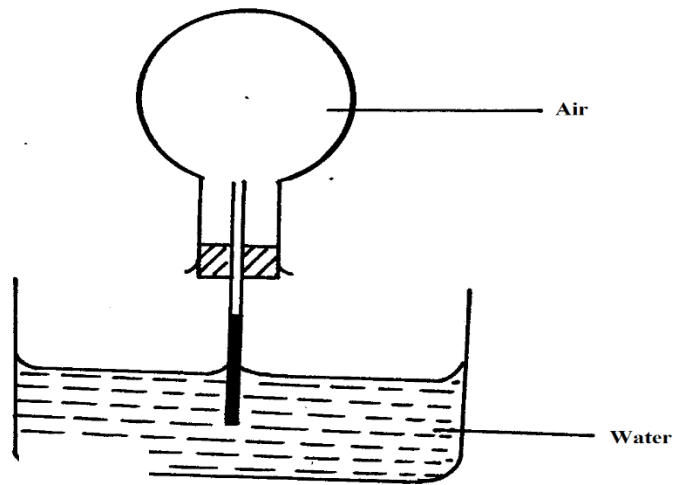


Figure 11

Explain what is observed when the flask is held with warm hands.

- iii) The mass M was suspended from a tight copper wire using a rider as shown. The copper wire was then heated.

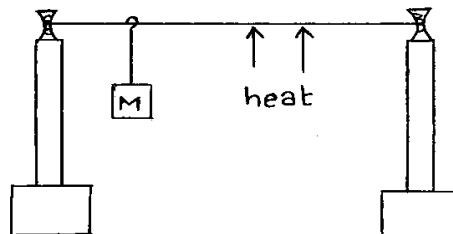


Figure 12

State what was observed on the position of M as the wire was heated for some time.

- iv) Figure 3 below shows two pieces of cork fixed on a polished and a dull surface with wax.

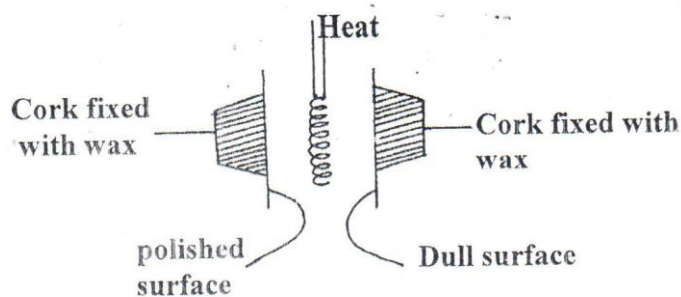


Figure 13

State and explain the observation made, when the heater is switched on for a short time given that the heater is equidistant from the two surfaces.

16 .a) List **three** effects of force.

b) State 3 ways how one can reduce friction in the moving parts of a machine

c) Distinguish between mass and weight of a body stating the units for each

d) Name two types of forces which can act between objects without contact

17. Figure 14 below shows a matchstick soaped on one end (end A) and placed on the surface of water.

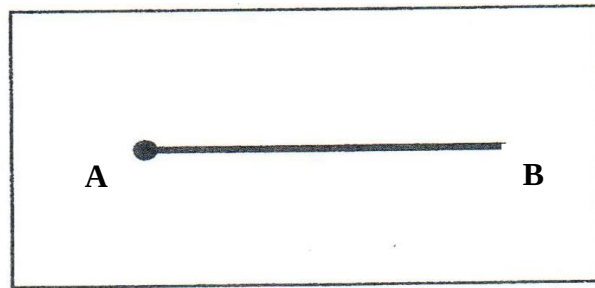


Figure 14

a) The matchstick is moved observed to move in a certain direction. State the direction and explain your answer.

b) A crystal of potassium permanganate was carefully introduced at the bottom of water column held in a gas jar. After sometimes the whole volume of water was coloured.

i) Explain this observation.

ii) State the effect of using warm water on the observation above.

17. Figure 6 below shows a ray of light being incident on a mirror.

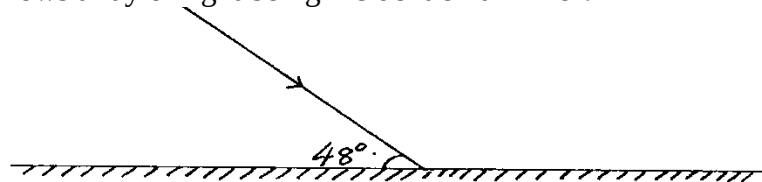


Figure 15

a.) What is the angle of reflection?

b) State the effect if any when there is an increase in the size of the hole of a pinhole

camera to;

- i. The size of image.
- ii. The brightness of image.
- iii. The sharpness of image.

c) Suggest;

- i) How the thermal conductivity of a metal depends on its temperature
- ii) Why most ceiling boards in hot areas should be painted white
- iii) Distinguish between natural and forced convection currents

d) The figure below shows a glass tube with water fitted with two identical thermometers A and B. It is heated as shown.

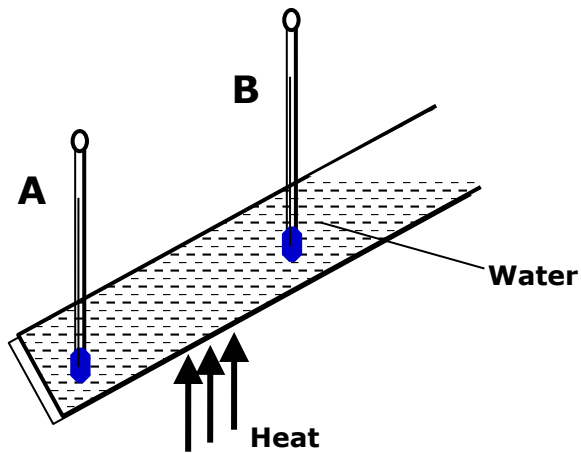


Figure 16

i) Explain the observation made in the reading of the thermometers above.

ii) State how in the vacuum flask, heat loss is reduced by;

Radiation;

Conduction;

Convection;

18. Write a good summary on the following topics;

a) Pressure

b) Thermal expansion

c) Heat transfer

d) Rectilinear propagation and reflection at plane surfaces

e) Electrostatics (I)

f) Cells and simple circuits